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Forest Renewal and Sustainability in British Columbia

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Abstract

Forest renewal management techniques improved significantly in British Columbia in the 1980's, while the 1990's can be characterized as the era of sustainability.

Two factors in the late 1980's were significant in bringing about greatly improved forest renewal management techniques. First, the 1985-1990 Canada-British Columbia Forest Resource Development Agreement provided significant funding for forest renewal research and for reforestation of the backlog of areas not satisfactorily restocked. Second, in 1987 the government of BC transferred the responsibility and cost of regeneration after harvest from the government to the forest industry.

Some of the improvements that resulted from these factors are:

- better seedling survival - survival rates increased from 54% in 1982 to 87% in 1988;
- improved stock types and seedling vigour - the number of stock types available increased from nine in 1987 to thirty in 1991;
- more and improved site preparation - annual site preparation tripled between 1982 and 1987, together with a significant shift from prescribed burning to mechanical site preparation;
- increased brushing and spacing - the annual area brushed increased ten-fold during the 1980's, with a trend towards decreased chemical brushing beginning in 1989.

With successful forest renewal techniques firmly in hand, the focus in the 1990's has been sustainability. The 1994 Forest Practices Code of British Columbia Act, along with associated regulations, standards

and field guides forms the Forest Practices Code. Following are just a few of the areas with respect to forest renewal and sustainability that the Code has significantly impacted:

- the requirement for silviculture prescriptions, stand management prescriptions, and for silviculture five year plans;
- limitations on clearcutting;
- protection of the soil by setting allowable disturbance levels during harvesting or site preparation;
- the requirement for ecosystem-based management;
- providing for the maintenance of biodiversity through planning requirements; and
- the requirement to use genetically improved seed where available.

Due to improved management techniques and to changes in policy and legislation, the accumulated backlog of not satisfactorily restocked areas has been dramatically reduced and will be eliminated shortly after the year 2000. As the law now requires regeneration of all harvested areas on public land, there is virtually no chance that the backlog will return.

Keywords: British Columbia, forest renewal, sustainability, Forest Practices Code

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Introduction

This paper briefly discusses the management practices and policies contributing to the renewal and sustainability of British Columbia's forests for future generations. Recent developments in B.C. tie in very well with the themes of the 15th Commonwealth Forestry Conference, particularly sub-theme 2: Management techniques and policies for natural forests and for plantation forests. Forest management techniques improved significantly in British Columbia in the 1980's, while the 1990's can be characterized as the era of sustainability.

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About British Columbia

Location and Size

British Columbia is the western-most province of Canada, bordering on the Pacific Ocean. It is large and diverse, spanning 11 degrees of north latitude, from the 49th to the 60th parallels, and 25 degrees of longitude. The land area is about 95 million hectares, roughly four times the size of Great Britain. Only 30 nations in the world are larger than B.C. It is the third largest province in Canada.

B.C.'s Physiography and Forests

The climate of British Columbia varies tremendously, ranging from almost Mediterranean conditions on some parts of the coast to sub-arctic conditions at higher elevations and in the far north. About one-half of B.C. is covered in forest, and about one-half of this, or one-quarter of the entire province, is considered available and suitable for timber harvesting.

B.C. has five broad physiographic regions, each representing a distinctive combination of climate, landform, vegetation, and soil (Figure 1). The approximately twenty commercial tree species vary

significantly between these regions, reflecting the great biological diversity present in the province. Major species consist of lodgepole pine (Pinus contorta); several species of spruce (Picea spp); western hemlock (Tsuga heterophyla); several species of fir (Abies spp); Douglas fir (Pseudotsuga menziesii); and western red cedar (Thuja plicata).

About 95% of the total forest volume of 8.5 billion m3 is coniferous, giving B. C. almost half of the national softwood inventory and 7% of the world softwood inventory (Council of Forest Industries 1995).

Figure 1 *British Columbia has five broad physiographic regions, reflecting the great biological diversity present in the province.*

Importance of Forestry to British Columbia

About 85% of British Columbia is designated as "Provincial Forest" which is owned by the province and is managed for all resource values, not just timber. Forestry is extremely important to the B.C. economy. Some quick facts illustrating this are:

- more than 130 communities in the province are largely dependent on the forest industry (White et al. 1986);
- one out of every six jobs in the province is directly or indirectly derived from forestry (Vancouver Board of Trade 1994);
- in fiscal year 1994/95, 75 million cubic metres were harvested from 190 000 ha, with 12% harvested by silvicultural systems other than clearcutting;
- Canada is the world's largest exporter of manufactured forest products, and British Columbia is a significant contributor to this, particularly in lumber exports (Figure 2);
- in 1993 B.C. shipped, by volume, 33% of the world lumber, 13% of the world pulp, and 10% of the world newspaper exports (B.C. Ministry of Forests 1996).

Figure 2 *B.C. is the source of a significant proportion of the world's exported forest products.*

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1980s -- Improvements in management techniques

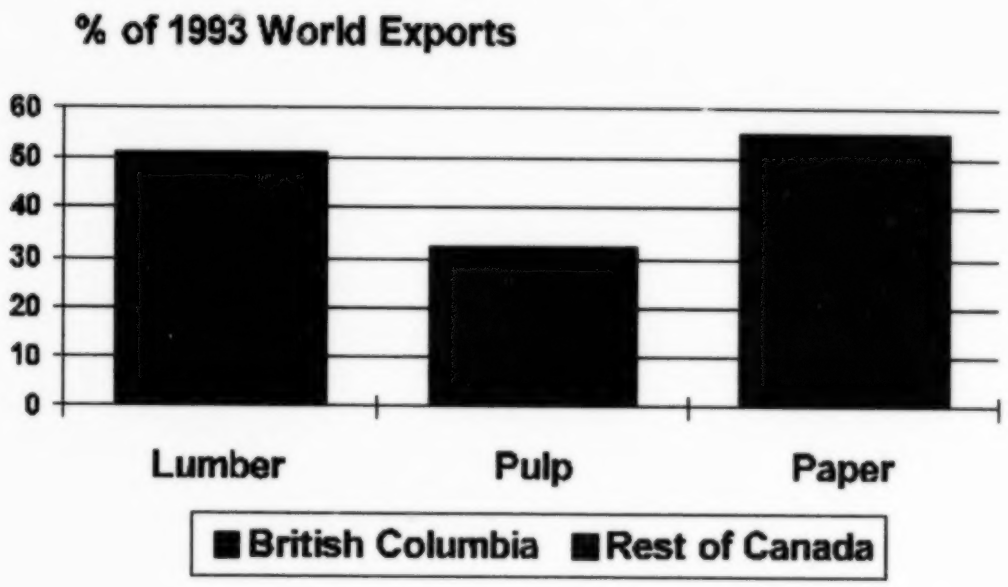
Two factors in the late 1980's were significant in bringing about greatly improved forest renewal management techniques. First, the 1985-1990 Canada-British Columbia Forest Resource Development Agreement provided significant funding for forest renewal research and for reforestation of the backlog of areas not satisfactorily restocked. Second, in 1987 the government of BC made sweeping changes to forest renewal policy. Most significantly, it transferred the responsibility and cost of regeneration after harvest from the government to the forest industry. Some of the improvements in forest management techniques that resulted from these factors follow.

Better Seedling Survival

Seedling survival rates increased substantially from 54% in 1982 to 87% in 1988 and have remained at about this level since then (Figure 3). This improvement can be attributed to a combination of factors, some of which are discussed in the following sections.

Yukon Territory of Canada
Northwest Territories
State of Alaska
Northern and Central Plateaus and Mountains
Great Plains
PACIFIC
Province of Alberta
Interior Plateau
Columbia Mountains and Southern Rockies
OCEAN
Coast Mountains and Islands
United States of America

Yukon Territory of Canada
Northwest Territories
State of Alaska
Northern and Central Plateaus and Mountains
Great Plains
PACIFIC
OCEAN
Province of Alberta
Interior Plateau
Columbia Mountains and Southern Rockies
Coast Mountains and Islands
United States of America


% of 1993 World Exports
60
50
40
30
20
10
0
Lumber
Pulp
Paper
British Columbia
Rest of Canada

Nineteen tree species, as well as spruce hybrids, are now being planted in the province. Two or more species are often planted on the same site.

***Figure 3** Average seedling survival for all species and stock types increased from 54% in 1982 to 87% in 1988. Survival rates have remained at or above this level since then.*

Improved Stock Types and Seedling Vigour

In 1987, before the transfer of responsibility to the private sector, there were only nine seedling stock types being grown in B.C. nurseries. By 1991, just four years later, 30 different stock types were being grown. There were also significant shifts to large stock types and from bareroot stock to container stock during the 1980's.

Improved nursery culture, as a result of a competitive nursery business, began providing high quality seedlings at a reasonable price.

A great deal of training in careful stock handling was also directed at workers involved in the planting program. As a result, seedling vigour improved greatly.

All of these trends continue to this day.

More and Improved Site Preparation

Two significant changes in site preparation took place during the 1980's. First, from 1982 to 1987 the amount of site preparation on Crown land more than tripled (Figure 4). Then, from 1987 to 1990 foresters responded to public opinion and significantly reduced burning in favour of mechanical site preparation. In 1990, the amount of area prepared by mechanical means was almost double the area prepared by prescribed fire. Only three years earlier (1987), the relative proportions were the reverse. Better techniques and equipment, and lower costs, made the switch possible. Disc trenching and mounding are now the most common types of site preparation in B.C.

***Figure 4** Site preparation tripled between 1982 and 1987 and has remained at more than twice the 1982 level since then. A significant shift from prescribed burning to mechanical site preparation took place between 1987 and 1990.*

Increased Brushing and Spacing

Young seedlings must be protected from brush and excessive tree competition which would choke them out or seriously inhibit their growth. Both activities increased substantially during the 1980's (Figure 5). The use of chemicals in brush control peaked in 1989 and has decreased significantly since then in favour of manual and mechanical methods, as well as sheep grazing.

***Figure 5** The total area brushed and spaced increased substantially during the 1980's. Chemical brushing has decreased since 1989 in response to environmental concerns.*

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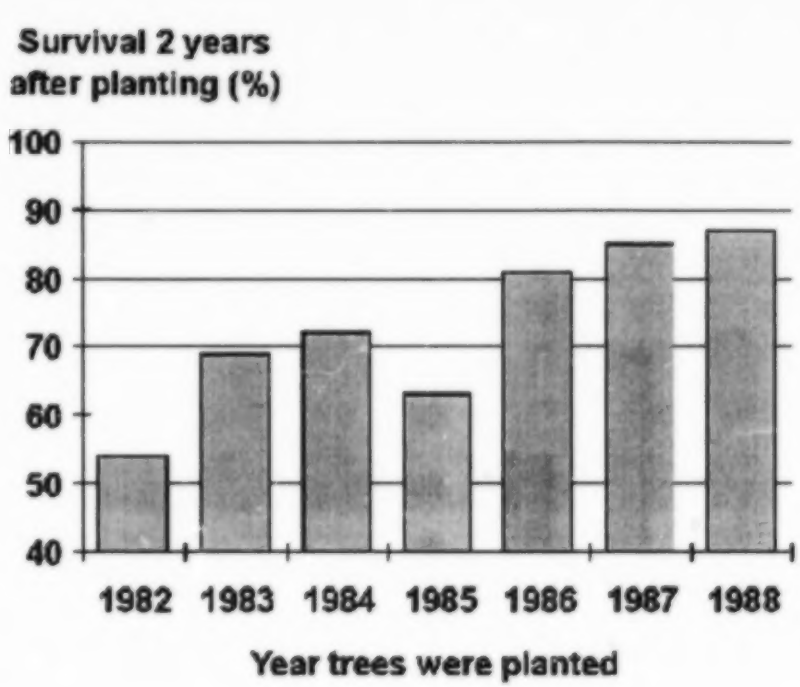
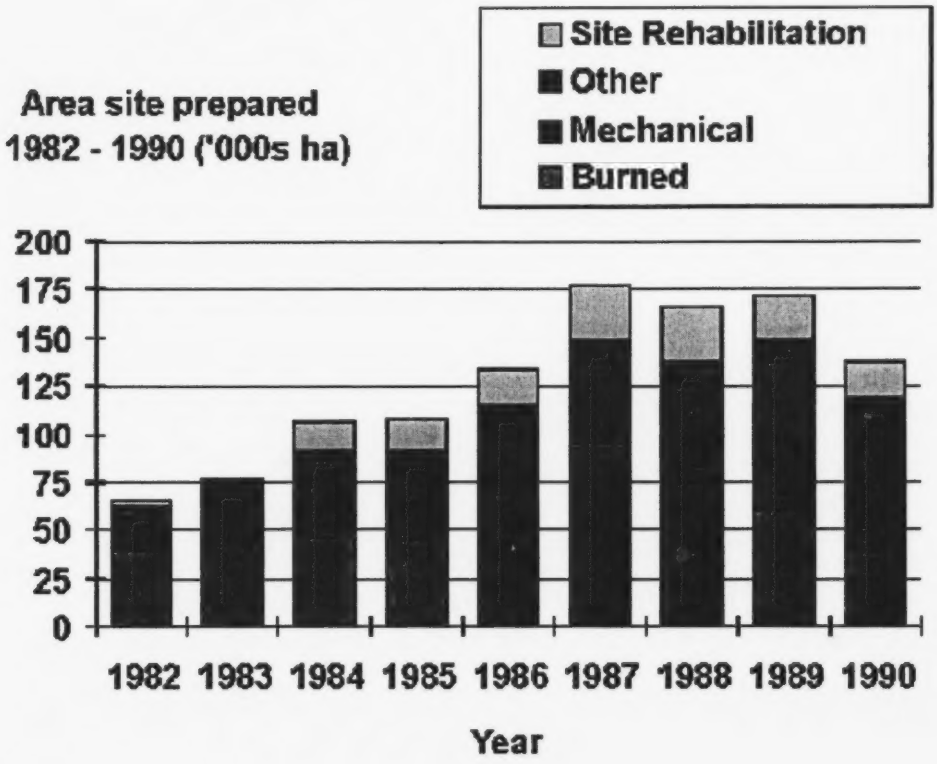
1990s -- Sustainability through the Forest Practices Code


Survival 2 years after planting (%)
100
90
80
70
60
50
40
1982
1983
1984
1985
1986
1987
1988
Year trees were planted


Area site prepared
1982 - 1990 ('000s ha)
Site Rehabilitation
Other
Mechanical
Burned
200
175
150
125
100
75
50
25
0
1982
1983
1984
1985
1986
1987
1988
1989
1990
Year

In 1994, the Government of British Columbia passed the Forest Practices Code of British Columbia Act. This act, along with associated regulations, standards and field guides forms the Forest Practices Code. The guiding principle behind the Code is the sustainable use of the forests we hold in trust for future generations. In response to public concerns about forestry practices, the act puts the force of law into changing the way the forests are managed in British Columbia.

The Code brings together under one umbrella many rules and regulations governing forest practices that were scattered over hundreds of documents.

Following are just a few of the areas that the Code has significantly impacted with respect to forest renewal and sustainability.

Silviculture Plans and Prescriptions

A key ingredient of the Code is the requirement for a silviculture prescription to be prepared well in advance of harvest. This prescription lays out the silvicultural system and harvesting method to be used. It provides a detailed plan for restocking to achieve a free growing stand 10 to 15 years after harvest. The plan must meet species diversity requirements, minimum and maximum stocking standards, as well as the requirements of higher level plans.

Stand management prescriptions are required by the Code for any silviculture treatments on free growing stands. The most common treatments include spacing, brushing, fertilization and commercial thinning.

A further requirement of the Code is the preparation of a five year silviculture plan. This plan must contain a yearly schedule of the treatments to be conducted on areas under silviculture prescriptions and stand management prescriptions. It must also contain a map showing the proposed location of the treatments for the first two years of the plan. The plan is intended to provide anyone who has an interest in the area with an overview of the treatments occurring across the land base.

Clearcutting

The Forest Practices Code addresses public concerns on clearcutting, first by setting mandatory limits on the size of cutblocks, and second, by requiring a silvicultural system other than clearcutting be used in specified circumstances, such as:

- on sites with unstable terrain;
- where it is incompatible with visual objectives;
- in wildlife habitat areas where the forest canopy is essential to maintain the animal population;
- in old-growth management areas; and
- along important fisheries streams or main streams in community watersheds.

Soil Protection

The Code places considerable emphasis on protecting forest soil from excessive disturbance due to logging road construction, skid trails or site preparation activities. Terrain hazard assessments and mapping of sensitive soil areas are now required across the entire province. Soil disturbance beyond allowable limits must be rehabilitated.

Ecosystem-Based Management

Since the early 1980's, British Columbia has been implementing an ecologically-based management system unparalleled in scope and usefulness. The biogeoclimatic ecosystem classification system uses climate, soil and vegetation data to identify over 600 different ecosystems. Today, foresters are required by the Code to use this system to make sound ecological decisions for every treatment they prescribe, including species selection.

Biodiversity

Maintaining biodiversity over such a broad range of ecosystems is a challenge. However, a 1992 study found that, whereas 32% of forests are monocultures before harvesting, only 29% of new forests were monocultures 5-15 years after harvesting, primarily due to the in-growth of natural seedlings (B.C. Ministry of Forests 1992). Using guides based on the biogeoclimatic ecosystem classification system, foresters prepare silviculture prescriptions which, by law under the Forest Practices Code, must plan to maintain biodiversity.

Genetically Improved Seed

The Forest Practices Code requires that, where available, genetically improved seed must be used. Tree breeding programs are now providing an ever increasing supply of genetically improved seed for the reforestation program. Approximately 27 million genetically improved seedlings were planted in 1995 with the number forecast to rise to 80 million by the year 2000, about 40% of the total.

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Conclusion

Changes in forest management practices and policies have brought about significant and permanent improvements in forest renewal in British Columbia.

Due to improved management techniques and to changes in policy and legislation, the accumulated backlog of not satisfactorily restocked areas has been dramatically reduced and will be eliminated shortly after the year 2000 (Figure 6). As the law now requires regeneration of all harvested areas on public land, there is virtually no chance that the backlog will return.

The renewal and management of British Columbia's forests will continue to provide a challenge, but there is now a solid foundation of success to secure sustainability for the future.

Figure 6 *The area not satisfactorily restocked has declined dramatically and is expected to be virtually eliminated within a few years.*

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Acknowledgement

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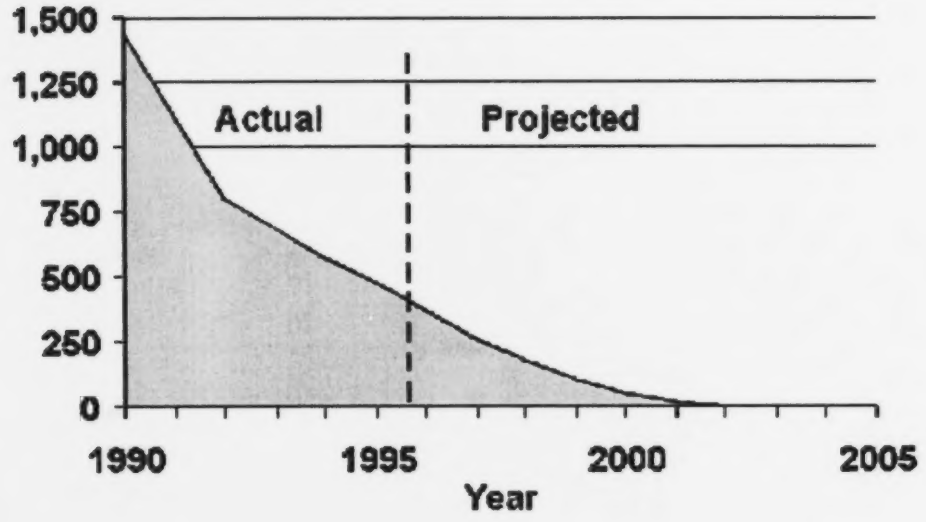
Area Not Satisfactorily Restocked ('000s ha)



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